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Apt., Woosan-dong, Kwangsan-ku, Kwangju-shi 506-757 (KR).

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(74) Agents: YIM, Suk-Jae et al.; 8th Floor, Poonglim Bldg., 823-1, Yeoksam-dong, Kangnam-ku, Seoul 135-784 (KR).

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(71) Applicant (*for all designated States except US*): KUMHO INDUSTRIAL CO., LTD. [KR/KR]; 49-1, Kwangcheon-dong, Seo-ku, Kwangju-shi 502-712 (KR).

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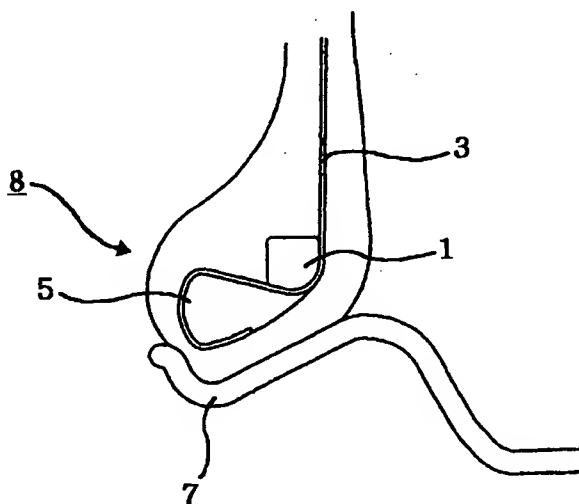
(72) Inventors; and

(75) Inventors/Applicants (*for US only*): CHUNG, Doh-Zong [KR/KR]; 106-605, Ilshin Apt., Wolgok2-dong, Kwangsan-ku, Kwangju-shi 506-777 (KR). PARK, Bok-Soo [KR/KR]; 102-1406, Kumho Apt., Wolkye-dong, Kwangsan-ku, Kwangju-shi 506-767 (KR). LEE, Myung-Jin [KR/KR]; 202-1303, Woosanjugong

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(54) Title: PNEUMATIC TIRE WITH REINFORCED BEAD PART



(57) Abstract: The present invention relates to a pneumatic tire with rubber lump applied to the bead portion, and more particularly, to a pneumatic tire wherein bead portion is reinforced by applying rubber lump on the side surface of lower portion of bead with carcass ply, optionally together with flipper which provides reinforcement, spirally wound through upper, side and lower portion of said rubber lump to the arbitrary point of upper portion of said bead so that by minimizing the movement of bead by means of said carcass ply or flipper, bead portion of tire is not easily broken away from the rim when air is evacuated from a tire which is installed on a special rim that does not have flange or while driving with tire of low air pressure.

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For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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PNEUMATIC TIRE WITH REINFORCED BEAD PART**Technical field**

The present invention relates to a pneumatic tire with a rubber lump applied to the
5 bead part, and more particularly, to a pneumatic tire wherein bead part is reinforced by
using a rubber lump, and carcass ply or a reinforcing structure which encloses the rubber
lump, to minimize the movement of the bead so that the bead portion is not easily
released from the rim of the tire, especially the tire installed on the rim without flange,
while driving under low air pressure of tire.

10

Background art

In conventional pneumatic tires, a wedge is installed at the side of the bead so that
the bead portion of the tire is not released from the rim when the tire is deflated or at low
air pressure. As one example of prior art, US Pat. No. 5,971,047 is illustrated in Fig. 1. As
15 shown in the figure, the upper part of carcass ply 3 winds a wedge 2 and is turned up, and
then spherical bead 1 is installed wound on the carcass ply. This art requires many
manufacturing steps and has many problems as described below.

First, the process of installing bead and wedge is very complicated, and there is a
possibility that the bead is released from the rim due to the movement of the spherical
20 bead applied when the tire is deflated. Moreover, since the hardness of the wedge 2 used
is low, about 95 or lower, the wedge 2 can be deformed partially on the portion
suppressed by the bead 1, and cannot perform desired role.

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Summary of the invention

The object of the present invention is to improve the bead portion of the pneumatic tire installed on the rim the toe of which is larger than the heel in diameter while not changing the function of the tire, and to provide a pneumatic tire which can prevent the bead portion from releasing from the rim when the tire is deflated so that car accidents
5 can be prevented.

Brief description of drawings

- Fig. 1 is a sectional view of the bead portion of a conventional tire,
10 Fig. 2 is a sectional view of the bead portion of a tire according to one embodiment of the present invention,
Fig. 3 is a sectional view according to another embodiment of the present invention, which inserts reinforcing structure in the bead portion, and
Fig. 4 a sectional view illustrating various embodiments of the present invention, in
15 which two sheets of carcass ply are installed winding in various forms.

Explanation of marks in the figures

- | | |
|---|----------------|
| 1: bead, | 2: wedge |
| 3, 3a, 3a', 3b, 3b', 3c, 3c', 3d and 3d': carcass ply | |
| 20 4: flipper | 5: rubber lump |
| 6: flange | 7: bead sheet |
| 8: bead portion | |

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Best mode for carrying out the invention

To achieve the object as stated above, a rubber lump is installed at the side surface of a bead, and a carcass ply winds the rubber lump in the same direction or in various shape, so that the rubber lump and the carcass ply wound thereto prevent the bead portion from
5 being released from the bead sheet of the rim when the tire is deflated.

The constitution of the pneumatic tire having reinforced bead part of the present invention will be described in detail with reference to the accompanying drawings.

Fig. 2 is a cross-sectional view of a tire according to one embodiment of the present invention, wherein a wedge-shaped rubber lump 5 having shore hardness of 95 ~ 100 is
10 installed at the bottom of the bead in square shape in order to decrease movement of the bead 1 in the bead portion 8 mounted to the bead sheet 7 of the rim, and a carcass ply 3 winds from the upper end to the lower end of the bead, and then from the upper surface to the side surface and to the bottom surface of said rubber lump 5. It is much more effective for the carcass ply 3 to wind in above order than it winds in the order of bottom surface,
15 the side surface and upper surface.

Now the process of manufacturing the bead part 8 in which the carcass ply 3 winds the rubber lump 5 will be described.

The carcass ply can be manufactured easily in the following manner: the rubber lump 5 winds at an arbitrary point of the molding drum, and one sheet of carcass ply 3
20 winds thereto, and the rubber lump 5 is turned down at both ends of the carcass ply 3 to wind the bead.

Accordingly, when the tire is deflated under-inflated while driving, the carcass ply 3 is pulled toward the side of the tire, and this force makes the carcass ply 3 push the bead 1 against the rubber lump 5. Then the rubber lump 5 is pushed to the rim and the bead 1
25 does not push rubber lump 5 any more. Therefore, the bead part 8 is not easily released

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from the rim because the bead part 8 is prevented from being released from the bead sheet 7.

Fig. 3 represents the pneumatic tire in which a flipper 4 is applied as a reinforcing structure. By using the reinforcing structure, the problem of prior art tire that the bead part of tire is moved to the wall area and released from the bead sheet 7 when the tire is deflated or is under-inflated while driving can be overcome. As illustrated in Fig. 3, the flipper 4 overlaps the carcass ply 3 under the rubber lump 5, and expands along the side surface and upper surface of the rubber lump 5, and passes under the bead 1, and finally reaches above the bead 1 so that the bead 1 and the carcass ply 3 are not be deviated from the bead sheet 7 area.

The figures (a), (b), (c) and (d) of FIG. 4 are cross-sectional views of the bead part of tire illustrating other embodiments of the present invention, wherein two sheets of carcass ply wind in various form in each bead part.

While one sheet of carcass ply is applied in the bead part of FIG. 2 and FIG. 3 respectively, two sheets of carcass ply are applied in the embodiments of Fig. 4; (a) two carcass plies 3a, 3a' wind to upper and lower part of the rubber lump 5, (b) two carcass plies 3b, 3b' wind to upper and lower part of the rubber lump 5 and meet and overlap at the side of the rubber lump, (c) two carcass plies 3c, 3c' wind the rubber lump 5 overlapping on the upper surface of the rubber lump 5, one carcass ply winding to the middle of the side surface of the rubber lump 5 and the other carcass ply overlapping said carcass ply and winding side surface of the rubber lump 5 completely, (d) two carcass plies 3d, 3d' wind the rubber lump 5, one carcass ply winding via lower surface of the rubber lump 5 to the middle of the side surface of the rubber lump 5 and the other carcass ply overlapping said carcass ply and winding the rubber lump 5 completely.

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Industrial applicability

By using the pneumatic tire with reinforced bead part of the present invention in a tire without flange, the bead part is not easily released from the rim when the tire is deflated or under-inflated while driving, and the function of the tire is not affected.

- 5 Therefore, the car accidents caused by released bead part can be prevented.

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CLAIMS

What is claimed is:

- 5 1. A pneumatic tire with reinforced bead part, wherein a rubber lump 5 is installed at the side of lower portion of the bead 1 in the bead part 8, and a carcass ply 3 winds said rubber lump 5 in the order of one upper side of said bead 1, lower portion of the bead, upper surface, side surface and lower surface of said rubber lump 5.
- 10 2. A pneumatic tire with reinforced bead part, wherein a carcass ply 3 winds to the lower portion of the rubber lump 5, and a flipper 4, overlapping with said carcass ply 3 on said lower portion of the rubber lump 5, winds in the order of side surface and upper surface of the rubber lump, the lower end portion of the bead 1, and upper end portion of the bead 1.
- 15 3. A pneumatic tire with reinforced bead part, wherein two sheets of carcass ply wind around the rubber lump 5, one carcass ply winding the upper portion of the rubber lump 5, and the other carcass ply winding the lower portion of the rubber lump 5, and two carcass plies meet at the side of the rubber lump 5 and overlap.
- 20 4. A pneumatic tire with reinforced bead part, wherein two sheets of carcass ply wind around the rubber lump 5 overlapping on the upper surface of the rubber lump 5, one carcass ply winding to the middle of the side surface of the rubber lump 5 and the other carcass ply overlapping said carcass ply and winding side surface of the rubber lump 5
- 25 completely.

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5. A pneumatic tire having reinforced bead part, wherein two sheets of carcass ply wind around the rubber lump 5, one carcass ply winding via lower surface of the rubber lump 5 to the middle of the side surface of the rubber lump 5 and the other carcass ply 5 overlapping said carcass ply and winding the rubber lump 5 completely.
6. A pneumatic tire having reinforced bead part of one of claims 1 through 5, wherein the shore hardness of the rubber lump 5 is between 95 and 100.

FIG. 1

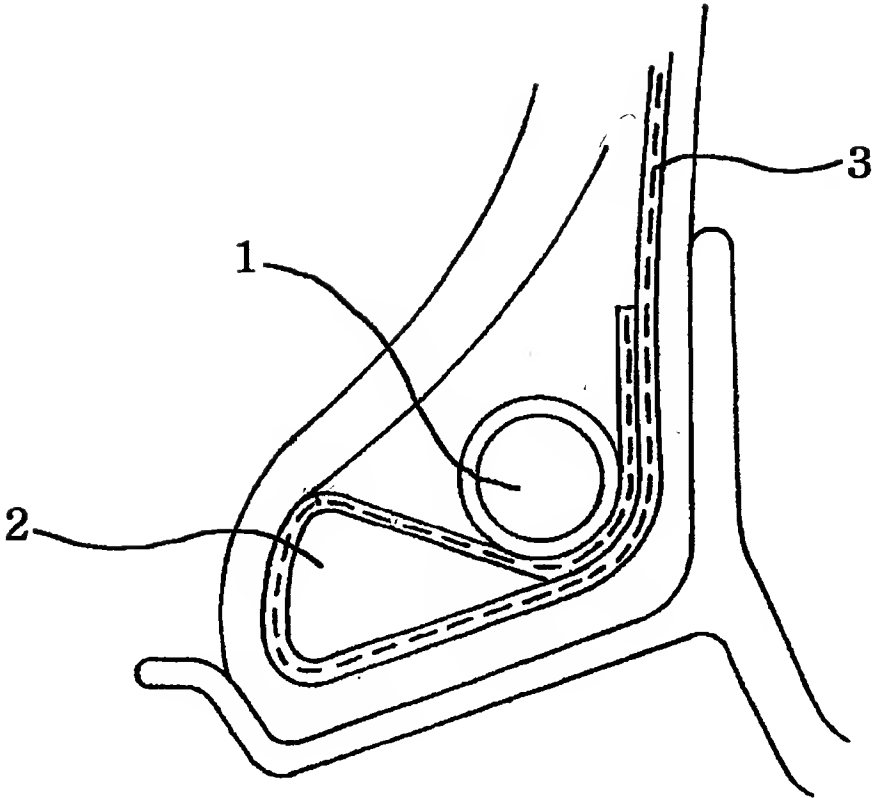


FIG. 2

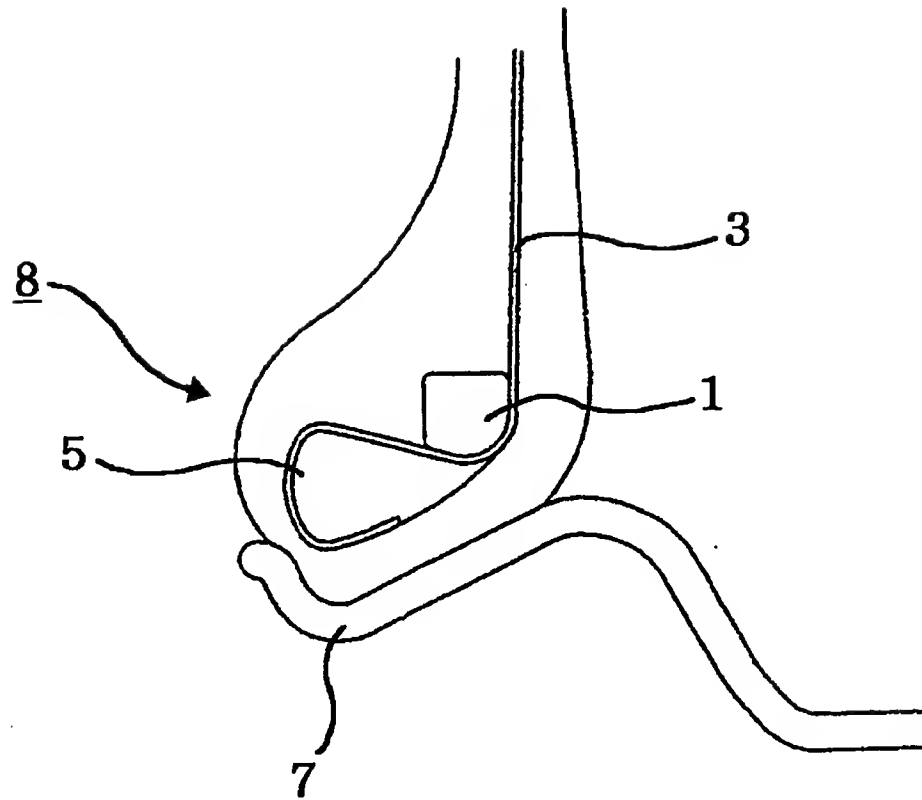


FIG. 3

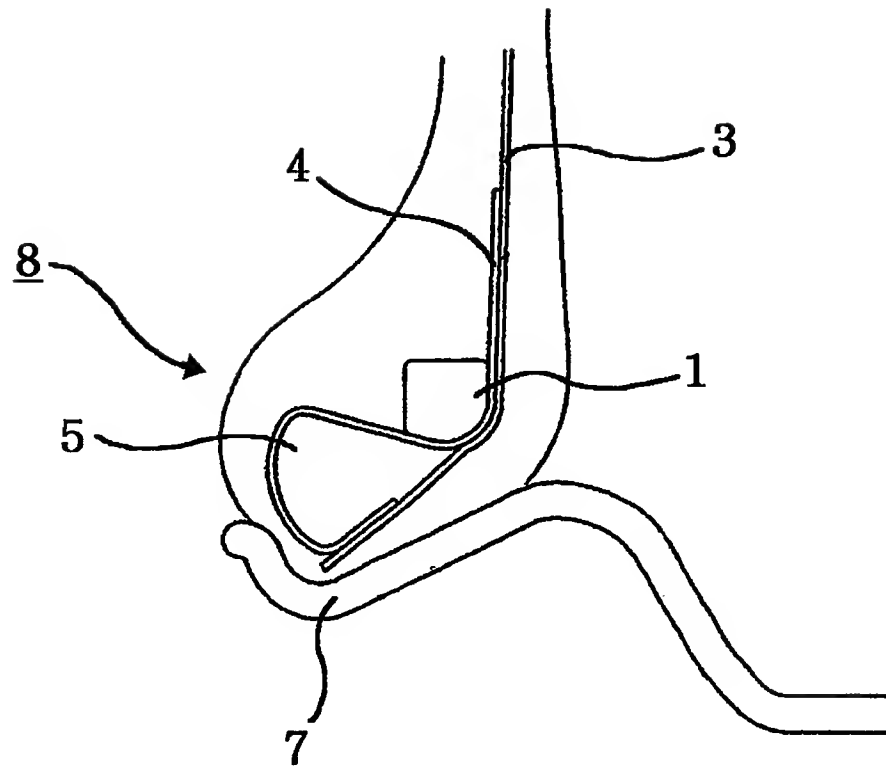
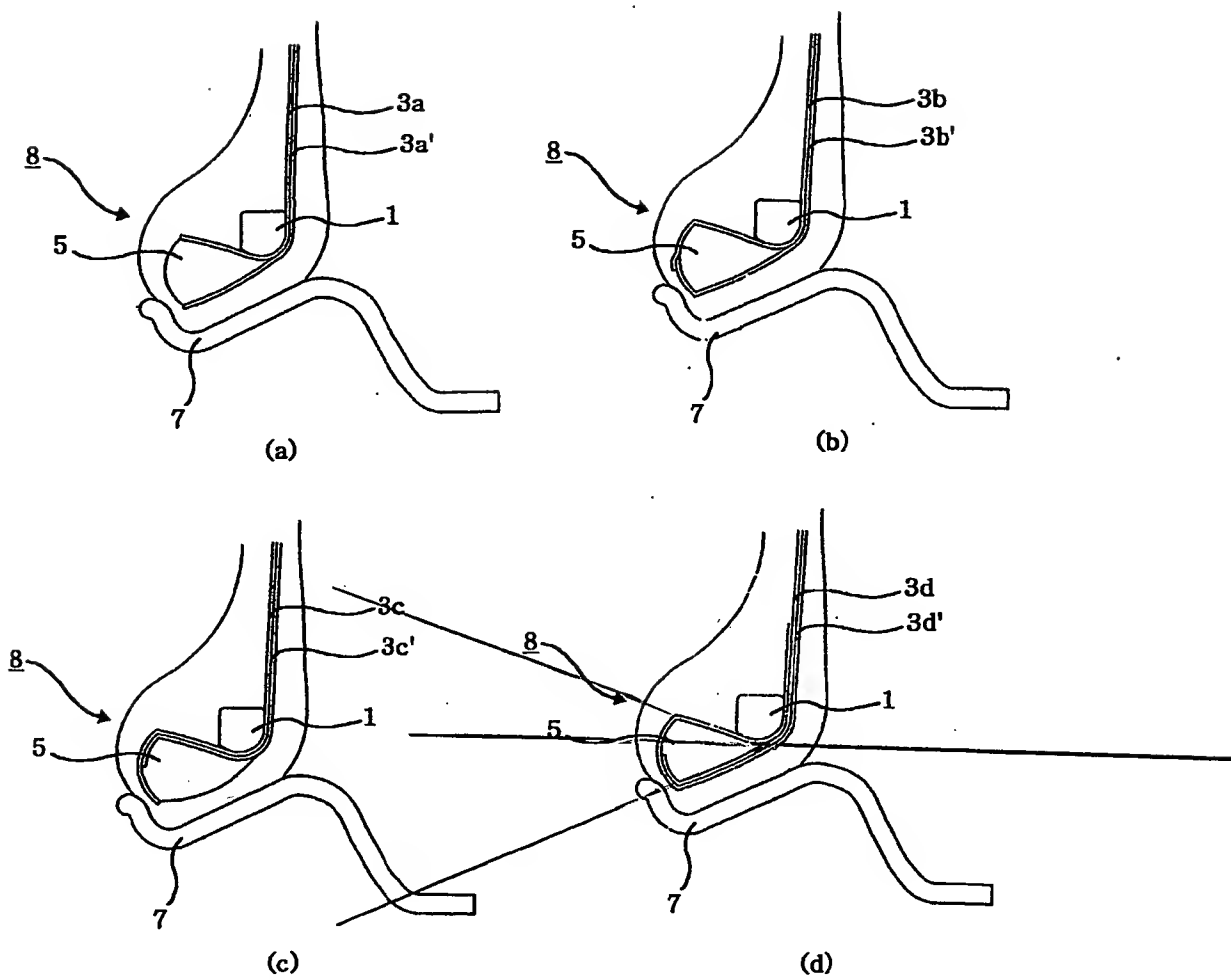


FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR01/01483

A. CLASSIFICATION OF SUBJECT MATTER**IPC7 B60C 9/02**

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 B60C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

EP, KR, JP, US : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6,179,028 B1 (Jean-Jacques Drieux, Volvic, Olivier Muhlhoff, Clermont-Ferrand) 30 January 2001 see abstract ; figure 1	1
A	EP 77,161 A2 (Jackson, William Lewis) 10 April 1982 see Column 6, line 20 - line 33 ; figure 2, 3	1
A	JP 7-17219 A (Bridgestone Co. Ltd) 20 January 1995 see abstract, figure 1	1
A	JP 6-227216 A (Bridgestone Co. Ltd) 16 August 1994 see abstract, figure 1	1

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

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Korean Intellectual Property Office
Government Complex-Daejeon, Dunsan-dong, Seo-gu, Daejeon
Metropolitan City 302-701, Republic of Korea

Facsimile No. 82-42-472-7140

Authorized officer

KIM, Sang Bae

Telephone No. 82-42-481-5427



INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR01/01483

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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JP 7-17219 A	20-01-1995	None	
JP 6-227216 A	16-08-1994	None	